The Macroeconomic Effects of Fiscal Adjustment Plans: Disaggregating Taxes and Spending

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1. Does the composition of a fiscal adjustment make a difference? How much of a difference?
   - cuts in current and capital spending
   - cuts in transfers
   - hikes in direct taxes
   - hikes in indirect taxes

2. Are these differences consistent with a theoretical macro model with tax distortions?
   - results from a new-keynesian DSGE model
Fiscal multipliers and the persistence of fiscal shocks

Istantaneous output multipliers to shifts in G and $\tau_n$ in Christiano, Eichenbaum and Rebelo (2011) for varying level of shocks persistence

![Graph showing the relationship between fiscal multipliers and the persistence parameter. The graph illustrates how the multipliers change with different levels of persistence for non-separable utility.](image-url)
Empirical Results: methodology and data

- Plans, rather than isolated shifts in fiscal variables

- Country-specific styles: extent to which plans are
  - announced in advance
  - consistent over time

- Narrative identification from a *reconstruction* and an *extension* of the Devries et al (2011) IMF dataset ("exogenous" fiscal consolidations in 14 OECD countries over 40 years)
Plans vs the existing literature

\[ e_t : \{ e^u_t, e^{a}_{t-i,t}, e^{a}_{t,t+i} \} \]

\[ e^u_t : \{ \tau^u_t, g^u_t \} \quad e^{a}_{t-i,t} : \{ \tau^{a}_{t-i,t}, g^{a}_{t-i,t} \} \quad e^{a}_{t,t+i} : \{ \tau^{a}_{t,t+i}, g^{a}_{t,t+i} \} \]

Romer and Romer (2010)

\[ e^{R&R}_t = \tau^u_t + \tau^{a}_{t,t+i} \]

Mertens and Ravn (2011)

\[ e^{M&R}_t = \{ \tau^u_t, \tau^{a}_{t,t+i} \} \]

Jordà and Taylor (2013)

\[ e^{J&T}_t = e^u_t + e^{a}_{t-i,t} \]

\[ \Rightarrow \text{i.e. } e^{J&T}_t \text{ is predictable} \]
Pooling data from different countries allowing for two sources of heterogeneity

- **within country** heterogeneity with respect to the type of fiscal adjustments
  - plans mostly based on
    - hikes in Direct Taxes
    - hikes in Indirect Taxes
    - cuts in Transfers
    - cuts in Government Spending

- **between country** heterogeneity in the way fiscal policy is conducted over time: *persistence*

\[
e_{i,t,t+j}^a = \varphi_{i,j} e_{i,t}^u + v_{i,t+j}
\]

⇒ Note that when the model contains announcements, the effect of an unanticipated shift in a fiscal variable can only be simulated using estimates of the \( \varphi \)'s
## Styles of fiscal adjustments (persistence of plans)

<table>
<thead>
<tr>
<th></th>
<th>AUS</th>
<th>AUT</th>
<th>BEL</th>
<th>CAN</th>
<th>DEU</th>
<th>DNK</th>
<th>ESP</th>
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<tr>
<td>$\varphi_1$</td>
<td>0.48</td>
<td>0.36</td>
<td>0.14</td>
<td>1.34</td>
<td>-0.10</td>
<td>0.48</td>
<td>0.27</td>
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<td>(</td>
<td>0.19</td>
<td>(0.08)</td>
<td>(0.14)</td>
<td>(0.17)</td>
<td>(0.12)</td>
<td>(0.13)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>$\varphi_2$</td>
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<td>0</td>
<td>0.11</td>
<td>0.51</td>
<td>-0.03</td>
<td>-0.02</td>
<td>0.06</td>
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<td>(</td>
<td>0.14</td>
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<th>FRA</th>
<th>GBR</th>
<th>IRL</th>
<th>ITA</th>
<th>JPN</th>
<th>PRT</th>
<th>USA</th>
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<td>$\varphi_1$</td>
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<td>0.35</td>
<td>0.21</td>
<td>-0.26</td>
<td>0.25</td>
<td>0.89</td>
<td>0.47</td>
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<td>(</td>
<td>(0.09)</td>
<td>(0.22)</td>
<td>(0.04)</td>
<td>(0.07)</td>
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<td>$\varphi_2$</td>
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<td>0.12</td>
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<td>(</td>
<td>(0.05)</td>
<td>(0.18)</td>
<td>(0.00)</td>
<td>(0.04)</td>
<td>(0.00)</td>
<td>(0.10)</td>
<td>(0.28)</td>
</tr>
</tbody>
</table>
Constructing plans and extending the data

▶ We go back to the original Devries et al. sources and
  ▶ separate out unanticipated, anticipated and implemented (but previously announced) shifts in taxes and spending
  ▶ organize the data into plans
  ▶ extend the data and construct plans that cover the period 2010-2014
  ▶ disaggregate expenditure in government consumption and investments and transfers, and revenues in direct and indirect taxes
  ▶ while doing this we double check the Devries et al. identification
Disaggregation

Taxes

▶ **Direct Taxes**: taxes on net income of individuals, on profits of corporations and enterprises, on capital gains and taxes on individual and corporate properties

▶ **Indirect Taxes**: taxes on transactions, goods and services (e.g. VAT, excise duties, stamp duty, services tax)

Spending

▶ **Government consumption and investment**: current expenditures for consumption of goods and services, public sector salaries, costs of state provided services (e.g. public education and health) plus all government fixed capital formation expenditures

▶ **Transfers**: money transferred by the government to households (e.g. pensions and unemployment benefits) and corporations (without expecting an economic gain, e.g. subsidies)
Labelling of plans

We define 4 types of plans. Plans mostly based on

- Direct Taxes
- Indirect Taxes
- Government consumption and investment
- Transfers

We label plans in two steps

- we evaluate whether the plan mainly consists of spending measures (EB) or tax measures (TB)
  - if the plan is EB, we assess whether it consists mostly of consumption and investment or transfers measures
  - If TB whether direct or indirect taxes prevail
### Average plans

#### 4 components - (1981-2014)

<table>
<thead>
<tr>
<th>Number of plans</th>
<th>Plan</th>
<th>Direct</th>
<th>Indirect</th>
<th>Consumption</th>
<th>Transfer</th>
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<tr>
<td>Direct Tax Based</td>
<td>38</td>
<td>1.67</td>
<td>0.73</td>
<td>0.22</td>
<td>0.31</td>
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<tr>
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<td>(0.06)</td>
<td>(0.05)</td>
<td>(0.08)</td>
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<tr>
<td>Indirect Tax Based</td>
<td>20</td>
<td>1.52</td>
<td>0.28</td>
<td>0.82</td>
<td>0.15</td>
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<tr>
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<td>(0.31)</td>
<td>(0.09)</td>
<td>(0.05)</td>
<td>(0.10)</td>
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<td>Consumption Based</td>
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<td>0.20</td>
<td>0.90</td>
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<td>(0.05)</td>
<td>(0.04)</td>
<td>(0.05)</td>
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<tr>
<td>Transfer Based</td>
<td>43</td>
<td>1.20</td>
<td>0.30</td>
<td>0.20</td>
<td>0.40</td>
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<tr>
<td></td>
<td></td>
<td>(0.20)</td>
<td>(0.06)</td>
<td>(0.04)</td>
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</tr>
</tbody>
</table>

[How IRFs are computed](#)
4-level disaggregation: output growth

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

\text{phi} = [0.35, 0.7] \quad \text{phi} = [1.34, 0.51]
4-level disaggregation: private consumption growth

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

phi=[0.35, 0.7]

phi=[1.34, 0.51]
4-level disaggregation: fixed capital formation

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

\(\phi = [0.35, 0.7]\)

\(\phi = [1.34, 0.51]\)
4-level disaggregation: ESI business confidence

**Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments**

- **phi=[0.35, 0.7]**
- **phi=[1.34, 0.51]**

▶ Negative phi
Fiscal plans in a NK framework (extending Chistiano, Eichenbaum and Rebelo, 2011)

- **Representative household:**
  - Infinitely lived with $U_t(C_t, G_t, N_t) = \frac{(C_t + a_g G_t)^{1-\sigma}}{1-\sigma} + \frac{N^{1+\psi}}{1+\psi}$
  - Invests in two types of assets: capital $K_t$ and risk free government bonds $B_t$
  - Subject to adjustment costs on investments
  - Receives lump sum transfer $T_t$ and pays payroll tax $\tau^d_t$ and private consumption tax $\tau^c_t$

- **Production side:** monopolistic competition among intermediary firms with Calvo price rigidity, flexible wages and constant returns to scale

- **Government**
  - 4 instruments: $\tau^d$, $\tau^c$, $T$ (lump sum transfers), $G$
    \[ G_t + T_t + (1 + i_t)\frac{B_t}{P_t} = \tau^d_t w_t N_t + \tau^c_t C_t + \frac{B_{t+1}}{P_t} \]

- **Monetary policy:** Taylor rule
Introducing plans

\[ G_t = (1 - \rho_G) G_{ss} + \rho_G G_{t-1} + e^{u,G}_t + \sum_{s=1}^{3} e^{a,G}_{t-s,t} \]

\[ T_t = (1 - \rho_T) T_{ss} + \rho_T T_{t-1} + e^{u,T}_t + \sum_{s=1}^{3} e^{a,T}_{t-s,t} \]

\[ \tau^d_t = (1 - \rho_{\tau^d}) \tau^d_{ss} + \rho_{\tau^d} \tau^d_{t-1} + e^{u,\tau^d}_t + \sum_{s=1}^{3} e^{a,\tau^d}_{t-s,t} \]

\[ \tau^c_t = (1 - \rho_{\tau^c}) \tau^c_{ss} + \rho_{\tau^c} \tau^c_{t-1} + e^{u,\tau^c}_t + \sum_{s=1}^{3} e^{a,\tau^c}_{t-s,t} \]

Note that each movement in \( e^{u,f}_t \), \( f \in \{ G, T, \tau^d, \tau^c \} \), is accompanied by

- announcements: \( e^{a,f}_{t,t+s} = \varphi_s e^{u,f}_t \), \( s \in \{1, 2, 3\} \)
- contemporaneous changes in fiscal variables other than \( f \)
  - e.g. the composition of the average CB plan is 50% \( G \), 17%, \( T \) and 12% each \( \tau^d_t \) and \( \tau^c_t \) (see slide 11)
Calibration as in CER. Plans: $\phi_1 = 0.35$, $\phi_2 = 0.7$, $\phi_3 = 0$
Conclusions

- **Empirical results**
  - Tax-based plans (both based on Direct and Indirect Taxes) are the most recessionary
  - Plans based on cuts in Spending are the least recessionary
  - Transfers-based plans are not very different from Spending-based plans

- This heterogeneity is consistent with the predictions of a simple NK model with tax distortions and standard calibration
Computing impulse responses

- Heterogeneity in styles implies that an initial correction of 1% of GDP will generate plans of different size across countries.

- We normalize plans, computing impulse responses to a plan of the size of 1% of GDP, while traditional impulse responses are computed with respect to a shock of 1% of GDP.

\[
e_{i,t}^u + e_{i,t,t+1}^a + e_{i,t,t+2}^a = 1
\]

\[
e_{i,t,t+j}^a = \varphi_{i,j}e_{i,t}^u \quad \text{for } j = 1, 2
\]

\[
e_{i,t}^u = \frac{1}{1 + \varphi_{i,1}^\wedge + \varphi_{i,2}^\wedge}
\]

As an example for Italy, where \( \varphi_{1}^\wedge = -0.24 \) and \( \varphi_{2}^\wedge = 0 \) we simulate \( e_{t}^u = 1.32, \ e_{t,t+1}^a = -0.32, \ e_{t,t+2}^a = 0 \).
Negative $\phi$